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ABSTRACT

This paper presents a pilot study designed to suggest an experiential interpretation of the development of extreme activity levels in infants (specifically, hyperactivity) and to demonstrate that general activity in infants may be influenced by the reinforcement contingencies established by mothers. Subjects were three 13-week-old infants. Operant techniques were used to modify the general activity level of the infants with the mother serving as a social reinforcer. Infant behavior was observed and recorded under four conditions: (1) Baseline (B) (no social reinforcement); (2) Noncontingent Baseline (NCB) (social reinforcement every two and a half to five seconds regardless of infant's activity); (3) Contingent Reinforcement for Activity (CRA) (social reinforcement for any increase in activity); and (4) Contingent Reinforcement for Non-Activity (CRNA) (social reinforcement contingent on the absence of activity for two seconds). Each CRA condition increased the frequency of activity bursts from the immediately preceding B or NCB condition, regardless of whether or not it contained social reinforcement. Data suggests that the target age for prevention/elimination of 'hyperactive' tendencies should be in early infancy. (CS)

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EFFECT OF SOCIAL REINFORCEMENT ON INFANT ACTIVITY: A PILOT STUDY

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At birth and within the first few months of life, there is considerable variation among infants in their levels of activity or arousal. When an infant's activity level is particularly high, usually a medical model is used to diagnose and treat the "hyperactivity." For example, it is typically assumed that there is some degree of neurological impairment which causes "hyperactivity," perhaps due to prenatal complications (e.g., rubella, Rh incompatibility), paranatal complications (e.g., difficult delivery) and/or postnatal complications (e.g., encephalitis). Nevertheless, regardless of the presumed causes and whether one differentiates among kinds of "hyperactivity," e.g., sensory or motor (e.g., Cruickshank, 1967), there is a paucity of evidence which convincingly relates neurological impairment to the behavioral manisfestations typically labeled as 'hyperactive " (Werry & Sprague, 1970); and this is particularly true in diagnosing hyperactivity in infants.

There has been much research in hyperactivity, particularly dealing with the use of drugs (e.g., Whitehead & Clark, 1970; Stewart, et al., 1966) and behavioral techniques (e.g., Patterson, 1965; Werry & Sprague, 1970) in modifying hyperactivity. However, one noticeable bias in the literature relates to the age of the subjects, i.e., she/he is usually three years or older. It would appear that regardless of assumptions of organismic and/or environmental etiology, that the factors influencing the activity level of infants are crucial in predicting, preventing, and/or eliminating hyperactivity

in children. This would be especially applicable to approaches which assume that hyperactivity can be modified by appropriate management of the environment, since it seems plausible that hyperactive children come from environments which rewarded hyperactive behaviors (or high magnitude and rates of behaviors) in infancy.

The purpose of this pilot study was to (a) suggest an experiential interpretation of the development of extreme activity levels in infants, although there can be little doubt that there are genetic differences at birth, and (b) demonstrate that general activity in infants may be influenced by the reinforcement contingencies established by mothers.

The activity level of infants is a characteristic readily noticed by mothers and one which often influences their attitudes toward their infants. As a result, a mother may influence her infant's level of activity by unwittingly providing reinforcement contingent on an increase in activity. For example, infants on self-demand feeding schedules may have the activity level, associated with the demanding behaviors (e.g., crying, movement of arms and legs), inadvertently reinforced by the contingent feeding. And if the mother occasionally fails to feed the infant immediately, thus allowing an increase in general activity (as evidenced by an increase in crying distress and movement), followed by feeding, she may be rewarding an <u>increase</u> in activity as well as establishing a partial reinforcement schedule for high activity in her infant. If no other factors interfere with this shaping process, an infant's activity level may continue to increase until such time he is diagnosed as "hyperactive." The development of this increased activity level is probably not due to only the contingencies in the environment, but likely a combination of predispositional factors (e.g., high activity at birth, mild

brain damage, gastro-intestinal malfunctioning) and the reactions of caretakers in the natural environment.

Several studies (e.g., Rheingold, Gewirtz, & Ross, 1959; Siqueland & Lipsitt, 1966; Fouts, 1974) demonstrate that a variety of infant behaviors may be modified by the reinforcement contingencies in the laboratory and natural environment. This study will attempt to demonstrate the application of operant techniques in modifying the general activity level of normal infants by having the mother serve as a social reinforcer.

Method

Subjects and Apparatus

Three 13-week-old infants (2 males, 1 female) served as Ss, and were obtained through contact with pediatricians. The experiment took place in a small room which contained a stabilimeter placed on a wooden box (which housed an automatic recording device), and a curtain 1 ft. from the stabilimeter. The stabilimeter was constructed from a standard baby scale. A metal rod, anchored to the inside mechanism (which moves when a baby moves), protruded downward through a hole in the top surface of the box. On the end of the rod was a felt-tipped pen which touched the surface of the recording paper as the paper passed through the recorder. E could look horizontally into the box and see the deflection of the pen when movement occurred.

Procedure

S was placed on his back on the stabilimeter, with his head facing upwards and in the direction of the curtain. The mother was instructed to stand behind the curtain, grasping the curtain in both hands; and upon a signal ("now") from E, she was to open the curtain, thrust her head forward and say

"peek-a-boo." This constituted the social reinforcement, the duration of which was approximately 2 seconds.

To insure that Ss were awake throughout the experiment, mothers were asked to bring their infants during the time of day they were most likely to be awake. The lighting in the room was a shielded fluorescent light which S faced (since his head was facing upwards). The noise level from the recorder was approximately 75 db (as measured from S's head). The combination of these 3 factors resulted in all Ss remaining alert throughout the experiment.

There were 4 conditions. The Baseline (B) involved no social reinforcement and the mere recording of behavior. The Noncontingent Baseline (NCB) consisted of presenting social reinforcement every 2½ or 5 seconds, regardless of the activity of S; this was used in order to determine whether the presentation of social reinforcement would have arousal properties. The Contingent Reinforcement for Activity (CRA) condition involved presenting social reinforcement contingent upon any increase in activity. The Contingent Reinforcement for Non-Activity (CRNA) condition involved presenting social reinforcement contingent upon the absence of activity for 2 seconds. The order of conditions varied according to S and the duration of time available for testing. The duration of each condition varied for each S and was determined by the apparent effect of that condition, e.g., increase or decrease in activity. The activity measure was the frequency of bursts of activity lasting, at least, 2 seconds.

Results

Each behavior record was divided into trials of 5 seconds and then blocked in 10 trials per trial block (TB). If there was an excess of seconds during a condition (second more than a multiple of 5), they and the responses

associated with them were eliminated from the end of the condition and not considered in the examination of data.

Subject #1. S was presented the NCB (10 reinforcers/TB) and CRA conditions. The results are presented in Table 1. An examination of activity during NCB reveals that the noncontingent presentation of social reinforcers tended to increase the activity, although not markedly. The presentation of social reinforcement contingent upon activity showed a marked increase in the frequency of bursts of activity. This suggests that perhaps contingent reinforcement increases activity over-and-above a general increase due to arousal in the noncontingent presentation of social reinforcement. It is not known whether or not an extinction condition (B or NCB) would have produced a decrease in activity.

Insert Table 1 about here

Subject #2. S was presented the following conditions: B, CRNA, B, CRA, B, and CRNA. In the CRNA condition (see Table 1), there was a temporary increase in activity, possibly due to the arousal properties of social reinforcement. The activity extinguished through the reinforcement of nonactivity. The lack of activity continued throughout the following B condition. The CRA condition produced a small but noticeable increase in activity, with the following B condition resulting in no activity. The final condition, CRNA, again produced a temporary increase in activity, which quickly diminished to zero.

Subject #3. S was presented the following conditions: B, CRA, NCB (20 reinforcers/TB), and CRA. S was noticeably inactive during the long B condition (S was awake and alert). During the CRA condition, there was no

appreciable effect of contingent reinforcement on activity. The following NCB condition produced a temporary increase in activity, presumably through the large amount of stimulation; however, the activity quickly extinguished. Returning to the CRA condition, the activity level increased, likely showing that S had learned the contingency.

Discussion

Each S appeared to be responsive to the conditions. Each CRA condition increased the frequency of activity bursts from the immediately preceding B or NCB condition, regardless of whether or not it contained social reinforcement. This finding suggests that the increase was likely due to the contingency of the social reinforcement and not arousal from additional stimulation. Another finding was that the CRNA condition, although producing a temporary increase in activity (probably due to arousal), resulted in a decrease in activity; this decrease may be due to a combination of extinction through no reinforcement of activity and reinforcement of nonactive responses.

These data are merely suggestive since the conditions were not systematically varied, nor number of reinforcements equated, nor conditions presented for long periods. Nevertheless, this research does suggest that the activity level of infants may be influenced by the contingencies of reinforcement around them. Therefore, the implication is that the target age for prevention and/or elimination of "hyperactive" tendencies should be in early infancy, not in childhood where most doctors/researchers/educators have focused their attention. Research is presently planned which will attempt to assess the contingencies mothers provide for activity in the home environment, and in which mothers of "hyperactive" infants will be trained to deliver social reinforcement for nonactivity in the home.

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Footnote

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Table 1

Frequency of Activity Responses for Subjects per Trial Block

	Trial Blocks
Subject #1	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
NCB*	0 0 2 0 0 1 3 3
CRA**	0 2 1 7 3 5 4 5
Subject #2	
B***	0 0 3 0
CRNA****	0 4 1 0 0 0 0 0 0
B	0 0 0 0 0 0
CRA	0 1 2 0 0 1 0 0 1 1
B	0 0 0 0 0 0
CRNA	1 0 1 0 0 0 0 0 0 0 0 0
Subject #3	
B	0 0 0 0 0 0 0 0 0 0 0 0
CRA	0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
NCB	0 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0
CRA	1 0 0 0 1 9 9 9 9 0 0 0 3 0 1 2 0 0 1 4

*Noncontingent Baseline

**Contingent Reinforcement for Activity

***Baseline

****Contingent Reinforcement for Nonactivity